STANDS FOR WHEELED VEHICLES

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EP0832030 (A1)
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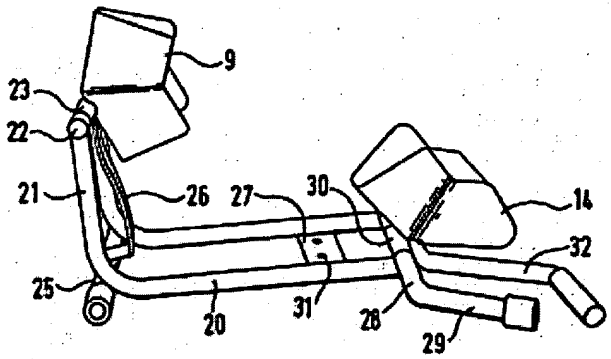
Cited documents:
GB767553
US3430983
DE3520765

Abstract of **WO9638336**

A stand for a wheeled vehicle such as a motorcycle includes a frame which has a first open-end wheel engagement shoe (9) pivotably mounted about a laterally extending pivot axis and a second wheel engagement shoe (14) spaced from said first shoe in the intended direction of movement of a wheel into the stand. Each shoe has spaced upstanding side walls each of which comprises facets (33), which in said intended direction of movement, are sequentially inclined away from and towards the longitudinal centre line of the respective shoe. These facets are also inclined away from a notional vertical plane which includes the longitudinal centre line of the shoe of contact of the wheel with the ground.



STANDS FOR WHEELED VEHICLES

This invention relates to stands for wheeled vehicles. More especially the invention relates to stands for supporting two-wheeled vehicles such as and motor cycles in an upright position.

Motorcycles and other two-wheeled vehicles are conventionally supported when stationary by a pivotably mounted arm secured to the vehicle frame and pivotal to a position in which the free end of the arm engages the ground. When so supported, the vehicle is inclined and relies solely upon the pivoted arm for support. If the arm or ground against which the arms bears moves, the motorcycle will fall and almost certainly sustain damage. Devices having wheel engaging shaped arms or plates between which the front wheel of a two-wheeled vehicle can be positioned for support purposes are known, an example of such a device being disclosed in EP-A-0111352. The shaped arms or plates are normally secured to a fixed post and are designed to support a particular wheel or tyre size. Also, the support provided by these devices is not overly efficient and even limited movement of a supported vehicle is likely to cause the vehicle to fall over.

The present invention provides an improved stand for two-wheeled vehicles which overcomes, or at least alleviates, many of the problems associated with the devices discussed above.

When transporting motorcycles, support is conventionally provided

simply by securing the vehicles to a rail of a transporting vehicle, often with adjacent vehicles in contact with one another. Sometimes motorcycles are transported in crates, often with their wheels removed. In either case, severe damage to motorcycles can occur when loading, during transit or when unloading.

The present invention provides a stand for two-wheeled vehicles suitable for use when transporting vehicles which overcomes or at least alleviates the transport problems discussed above.

Recovery of motorcycles damaged in, for example, road accidents is conventionally achieved simply by loading the damaged vehicles by means of an inclined ramp onto a conventional pick-up truck. Loading of an undamaged vehicle in this way is difficult. However, if the vehicle has sustained damage to one or both of its wheels, loading is seriously impaired. Towing assemblies for motorcycles are disclosed in US-PS-3430983 and US-PS-5352083. In the former document a trailer hitch is described having wheel engaging linearly curved shoes which engage the periphery of the tyre of the motorcycle's front wheel. The forwardmost shoe is fixed to a post (but can be moved towards and away from the vehicle tyre to lock the tyre in place) and the rear shoe is mounted for pivotal movement about a pin. The shaping of these shoes is such that only one or a very limited range of tyre diameters can be accommodated within the shoes if the required tyre contact is to be achieved. US-PS-5352083 discloses a towing truck which includes a wheel lift having rotatable tyre braces to assist loading of a towed vehicle and to provide firm support of the vehicle's tyres during towing.

The present invention provides an improved stand for two-wheeled vehicles suitable for aiding the recovery of damaged vehicles which overcomes or at least alleviates many of the problems associated with the devices disclosed in the above discussed two documents.

According to the present invention in one aspect there is provided a stand for a wheeled vehicle, the stand including a frame having a first open-end wheel engagement shoe pivotably mounted about a laterally extending pivot axis and a second wheel engagement shoe spaced from said first shoe in the intended direction of movement of a wheel into the stand, each shoe having spaced upstanding side walls each of which comprises facets which in said intended direction of movement, are sequentially inclined away from and towards the longitudinal centre line of the respective shoe, and which are also inclined away from a notional vertical plane which includes the longitudinal centre line of the shoe.

In another aspect, the invention provides a stand for a wheeled vehicle, the stand comprising a frame having first and second open-ended wheel engagement shoes mounted for pivotal movement about laterally extending pivot axes which are spaced apart in the intended direction of movement of a wheel through the stand by a distance such that leading and trailing portions of the wheel are captured respectively by the first and second shoes with the vertical axis of the wheel lying between the pivot axes of the shoes.

In another aspect the invention provides a stand comprising a first wheel engagement member pivotable about an axis generally normal to the direction of entry of a wheel into the stand and including an abutment surface which is engaged by the wheel as it enters the stand and is pivoted thereby to a position in which the leading end of the engagement member rests in contact with the wheel circumference at a position behind the point of contact of the wheel with the ground.

The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a front view of a stand in accordance with the invention

with a wheel of a vehicle supported therein;

Figure 2 is a side view in perspective of a further stand in accordance with the invention;

Figures 3 and 4 are side views of the stand illustrated in Figure 2 before and after entry of the vehicle wheel into the stand;

Figure 5 is a front view to an enlarged scale of a detail of the stand shown in Figures 3 and 4;

Figures 6 to 8 are respectively front, side and plan views from above of a wheel engagement shoe of the stand shown in Figure 5;

Figure 9 is a plan view from above of a steel sheet from which the wheel engagement shoe of Figures 6 to 8 is produced;

Figure 10 is a plan view from above partly in section of a further stand in accordance with the invention; and

Figures 11 and 12 are side and schematic plan views of an alternative stand in accordance with the invention.

The motorcycle stand illustrated in Figure 1 comprises a frame 1 supported on feet 2 and having sides 3 and a rear 4. The front of the frame is partially closed by facing members 5 which are spaced to define an opening for entry of the front wheel 6 of a motor cycle to be supported within the stand. A support in the form of a tube 7 extends across the front of the stand towards the base thereof and defines an axle for a sleeve 8 to which a first wheel engagement shoe 9 is secured. Shoe 9 comprises a pair of spaced angled side arms 10 each joined at one of their ends to define a yoke which is welded to the sleeve 8 and at their other ends to a

cross-bar 11. The engagement shoe 9 is able, through its connection to the sleeve 8, to pivot between a first position in which the bar 11 is in contact with the ground and a second position in which it is raised from the ground.

A second wheel engagement shoe 14 is provided towards the rear of the stand. This engagement shoe 14 also comprises a pair of angled arms 15 each welded at one end to a sleeve 18 and each welded at its other end to a trailing arm 17. The sleeve 18 is mounted for pivotal movement on a bar which is secured to the upper end of the rear member 4 of the stand. A leaf spring 19 is secured to the sleeve 18 and operates to urge the shoe 14 into engagement with the tyre of the wheel 6.

The stand illustrated in Figures 2 to 5 is similar to that illustrated in Figure 1 and like parts have been given the same reference numerals. The main difference between the respective stands is in the construction of the frame and the wheel engagement shoes 9 and 14. In Figure 1 the engagement shoes are produced from steel tubes; in Figures 2 to 5 they are produced from steel plate. In operation they have precisely the same effect. Also, in Figure 1 the frame is generally produced from steel plate; in Figures 2 to 5 the frame is generally produced from steel tubes. Again, the effect is precisely the same.

More especially, the stand shown in Figure 2 comprises a tubular steel frame including a ground engaging base defined by a pair of tubes 20 bent through substantially 90° to define upstanding arms 21 which support a tubular cross-member 22. The cross-member is welded to the upper ends of the arms 21 and carries a coaxial tube 23 to which is secured the wheel engagement shoe 9. The tube 23 is free to rotate about the surface of the cross-member 22.

A tubular cross-member 25 is secured to the lower ends of the

upstanding arms 21 and has welded to it one end of a leaf spring 26. The free end of this leaf spring 26 lies behind the rear surface of the wheel engaging member 9 and operates to urge the member 9 into engagement with the tyre of a wheel when in use.

The tubes 20 are joined by a central cross-piece 27 and at their ends remote from the upstanding arms 21 by a rear tubular cross-piece 28 having rearwardly extending feet 29. The length of these feet can be varied to provide greater or less stability for the stand. The rear cross-piece 28 carries a coaxial tube 30 to which is secured the other wheel engagement member 14. The tube 30 is freely rotatable about the periphery of the rear cross-piece 28.

The central cross-piece 27 has holes 31 to enable the stand to be secured to the surface on which it sits.

Secured to the engagement shoe 14 is a foot operated lever 32 for moving the shoe 9 about the cross-piece 28. The lever 32 pivots with the shoe.

As will be seen from Figure 3, as the wheel 6 of a motor cycle enters the mouth of the engagement shoe 9, its tyre comes into contact with the side walls of the engagement shoe. Each side wall comprises two sheet steel facets 33. The contact areas are indicated in Figures 3 to 5 by chain-dotted lines reference of 35 and will be discussed in greater detail below. As shown, two contact areas 35 are present on each side wall of the engagement shoe, that is to say one contact area for each facet 33. As will be seen from Figure 4, continued forward movement of the wheel causes the engagement shoe 9 to pivot. At this juncture, the wheel 6 is carried forwardly and downwardly in an arcuate movement about the pivot axis of the shoe 9. The leading periphery of the tyre is captured by the shoe 14 and the four areas contact 35 between the shoe 14 and the tyre are made.

The actual location of these areas of contact will depend upon the diameter and cross-sectional width of the tyre taken at rest; the bottom of the tyre is spaced from the floor of the shoe 14. Thus, the weight of the bike acts on the clamping frame which secures the wheel 6. The shoe 9 operates in the same way, the bottom of the tyre being spaced from the floor of the shoe. The pivot centres of shoes 9, 14 are set to accommodate all known current motor cycle front tyre diameters. Also, the width of the shoes 9,14 are set to accommodate the widths of all current motor cycle tyres. The pivot centre dimensions and shoe widths may be varied to accommodate other ranges of tyre diameters and widths.

The wheel is now held firmly within the stand and the vehicle can only be removed from the stand by downward pressure or the now raised foot operated lever 32 and by simultaneously pulling the vehicle away from the stand.

The wheel engagement shoes 9, 14 are illustrated in greater detail in Figures 6 to 9. Each wheel engagement shoe comprises two separately formed identical or closely similar plate sections which, when folded, are butt welded together. When folded, each plate section has two outwardly inclined facets 33 and a floor 37. A plate section 36 prior to folding is illustrated in Figure 9, the fold lines being indicated by broken lines 41. Once folded to provide an angle inclined to the vertical which is selected to ensure that the constructed engagement shoe will accept a required wide range of wheel and tyre sizes, two folded sections 36 are welded along the irrespective inclined edges 38 to produce an engagement shoe having a floor and four angled facets 33 which, in use, together make contact with the profile of any wheel or tyre within the selected wide size range at the four separate and generally symmetrical contact areas 35 discussed above. As will be discussed below, welding of the folded plates along their respective inclined edges 38 compounds the angle extended by each facet 33 so that each is not only inclined outwardly but also away from the centre

line of the shoe. In this way, the clamping forces applied by each engagement shoe are evenly distributed over a relatively wide area. With both engagement shoes in contact with a vehicle tyre, eight contact areas 35 (one for each facet) are provided.

As will be seen from Figure 6, each facet 33 lies in a plane which is inclined at an angle to a vertical plane passing through the respective fold line 41 with the shoe base and which is also inclined at an angle with respect to the longitudinal axis of the shoe. These angles are compounded through an angle subtended between the floor sections 37 of the two welded pieces which make up the shoe.

This construction ensures that a motorcycle wheel is positioned within the stand is held firmly in place with the wheel held upright and substantially vertical, these being eight firm contact areas 35 between the tyre or wheel and the inclined sides of the shoe 9 or 14.

Turning now to Figure 10, the illustrated stand includes a locking mechanism for securing a wheel of a motorcycle positioned in the stand. For ease of understanding, similar parts to the discussed above have the same reference numerals.

The wheel 6, tyre 42, brake discs 43, wheel spindle 44 and front fork legs 45 of a motorcycle positioned within the stand are shown in Figure 10. The stand includes two side arms 46 which carry shield plates 47 which, in use of the stand, mask the wheel spindle 44. The side arms 46, may be formed from carbon steel plate and the shield plates from mild steel plate. Extending between the side arms and through the wheel 6 is a solid round locking bar 46 formed from, for example, a carbon steel. The central section of the locking bar 48 may be undercut to accommodate a plastics sleeve to prevent damage to the wheel rim. Each side arm 46 is formed with an elongate recess 49 open on one side and closed at its outer side, the

security bar being introduced through the openings and then moved into the closed section for locking using, for example, a compact straight pin high security shackle lock, fitted with a unique key and locking mechanism (not shown). An alarm (e.g. a trembler alarm) activated by movement of the locking bar 48 may be provided.

The stand illustrated in Figures 11 and 12 is of particular use for recovering and transporting motor cycles. For ease of understanding, similar parts to those discussed above have the same reference numerals. As will be seen from Figure 11, the stand is supported on front and rear wheels 50, 51, and is able, therefore, to be attached to a winch 52 of a recovery vehicle for loading onto that vehicle. A towing loop 53 is secured to the front of the frame is provided for this purpose. Further loops 54 are provided to receive securing ties 55 attached to a motor cycle supported by the stand. Once loaded, additional ties may be provided. Ratchets 56 for tightening the ties may be provided.

Stands in accordance with this invention may be fixed to the floor of a trailer for transporting motor cycles from one location to another. Thus, the wheel engagement members described above can readily be incorporated into a trailer as disclosed in corresponding International Patent Application PCT/GB94/01380.

It will be appreciated that the apparatus described above is exemplary of stands in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention as set out in the appended claims.

CLAIMS

1. A stand for a wheeled vehicle, the stand including a frame having a first open-end wheel engagement shoe pivotably mounted about a laterally extending pivot axis and a second wheel engagement shoe spaced from said first shoe in the intended direction of movement of a wheel into the stand, each shoe having spaced upstanding side walls each of which comprises facets which in said intended direction of movement, are sequentially inclined away from and towards the longitudinal centre line of the respective shoe, and which are also inclined away from a notional vertical plane which includes the longitudinal centre line of the shoe.

2. A stand as claimed in Claim 1 wherein the lower margins of the facets of each side wall of said first open-ended shoe are inclined one with respect to the other, the lower margin of the leading facet in the said direction of movement being inclined downwardly towards said pivot axis and the lower margin of the trailing facet being inclined upwardly away from said pivot axis.

3. A stand as claimed in Claim 1 or Claim 2 wherein each shoe comprises first and second channel-section members whose sides are defined by said facets.

4. A stand as claimed in Claim 3 wherein each shoe is formed from a pair of steel sheets each having a central generally rectangular section and two side sections extending outwardly from the rectangular section, one edge of each side section being inclined at an angle to said rectangular section, each channel section member being formed by folding the respective steel sheet along the longer sides of the

generally rectangular section and welding the two so formed channel sections together along their inclined edges.

5. A stand as claimed in any one of claims 1 to 4 wherein the first wheel engagement shoe includes a sleeve mounted for rotation about a rod secured to the frame and extending laterally thereto, the rod defining the pivot axis for the first wheel engagement shoe.

6. A stand as claimed in any one of claims 1 to 5 wherein the second wheel engagement shoe is pivotably mounted about a rod secured to the frame and extending laterally thereof, the rod defining a pivot axis for the second wheel engagement shoe.

7. A stand as claimed in Claim 6 further comprising a spring operable to urge the second wheel engagement shoe into contact with a wheel captured within that shoe.

8. A stand as claimed in any one of the preceding claims further comprising side pieces which extend rearwardly from the front of the stand and overlie the axle of a wheel captured by the wheel engagement shoes of the stand, and means for locking said wheel to said side pieces.

9. A stand as claimed in Claim 8 wherein said locking means comprises a laterally extending bar secured to each side piece.

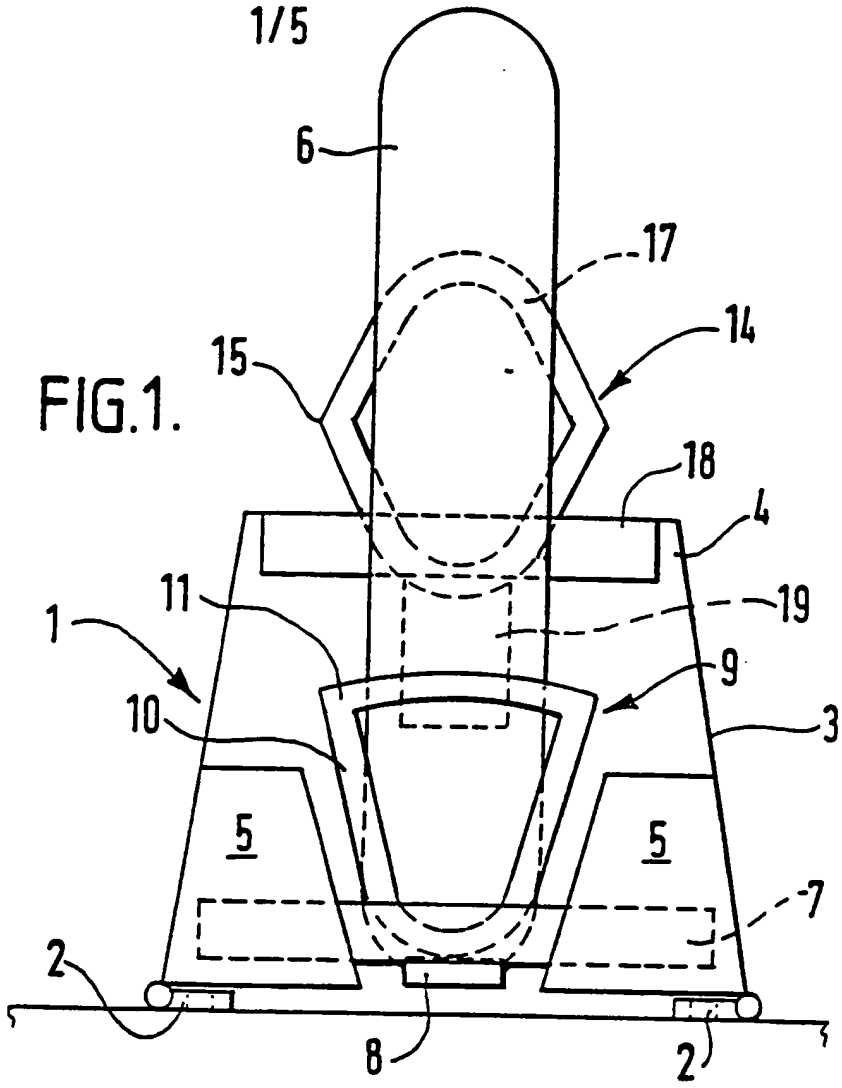
10. A stand as claimed in any one of claims 1 to 7 further comprising ground engaging wheels secured to the front and rear of the stand.

11. A stand as claimed in Claim 10 further comprising attachment means for connecting the wheel-mounted stand to a cable of a winch.

12. A stand for a wheeled vehicle, the stand comprising a frame having first and second open-ended wheel engagement shoes mounted for pivotal movement about laterally extending pivot axes which are spaced apart in the intended direction of movement of a wheel through the stand by a distance such that leading and trailing portions of the wheel are captured respectively by the first and second shoes with the vertical axis of the wheel lying between the pivot axes of the shoes.

13. A stand for a wheeled vehicle substantially as herein described and as described in Figure 1, or Figures 2 to 9, or Figure 10, or Figures 11 and 12 of the accompanying diagrammatic drawings.

FIG.1.


6
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8
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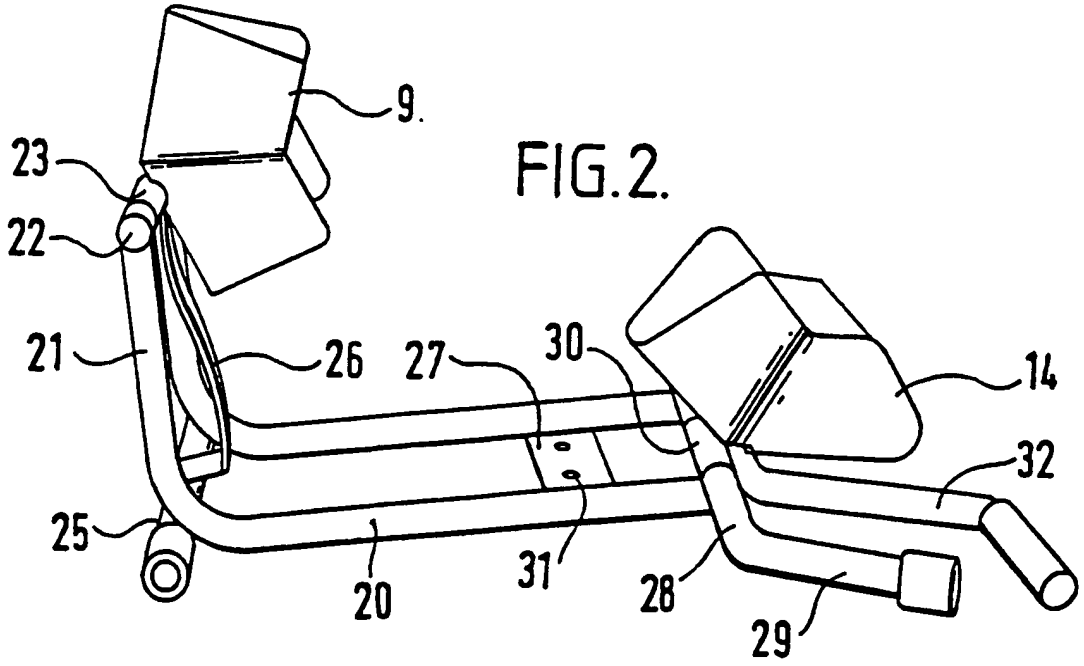
FIG.2.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32
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20
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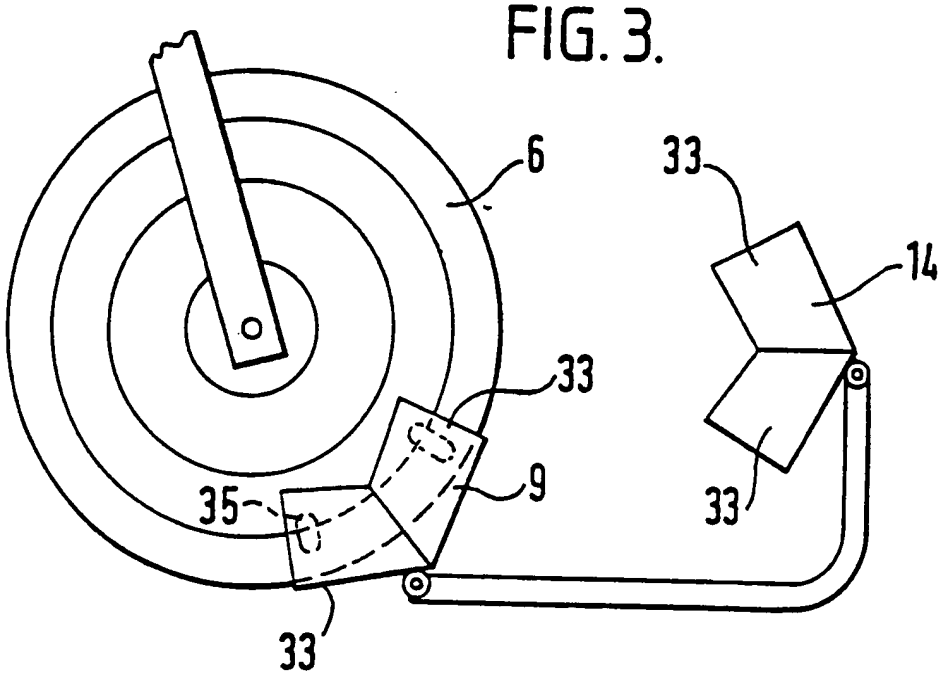
FIG. 3.



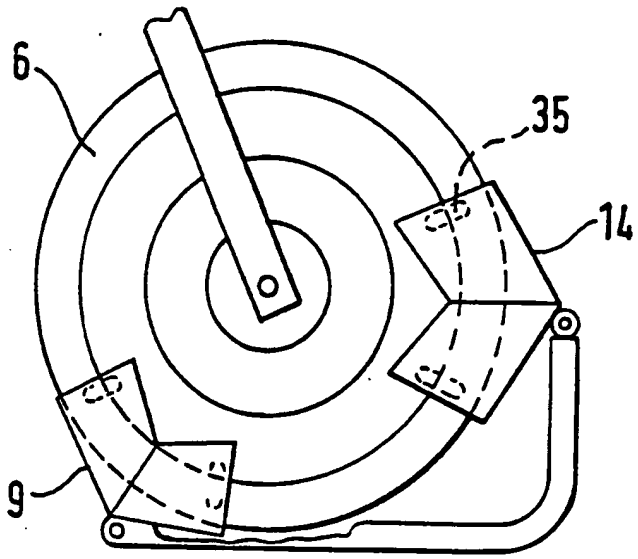


FIG.4.

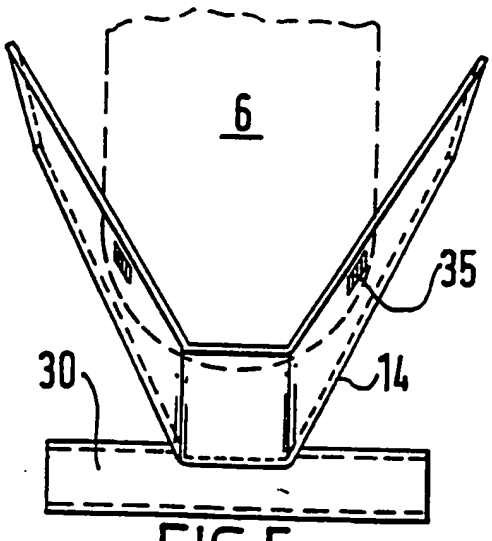


FIG.5.

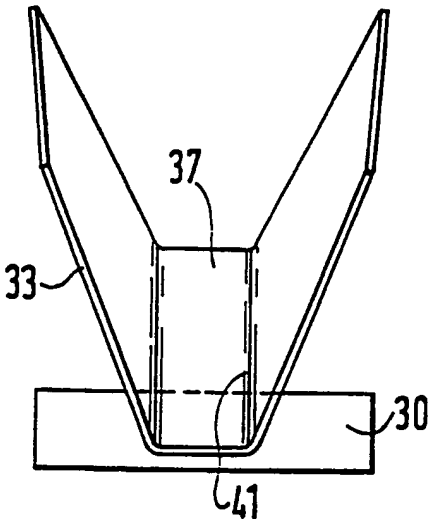


FIG.6.

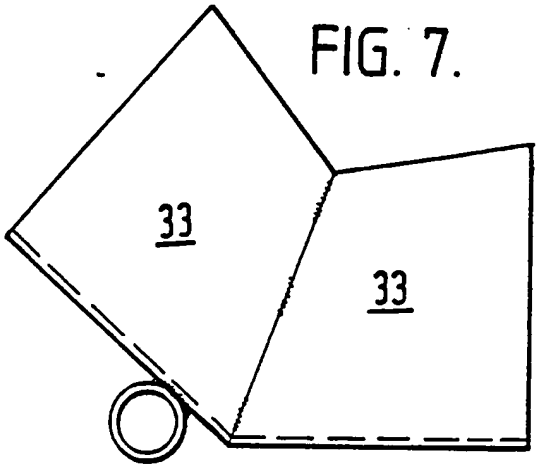


FIG. 7.

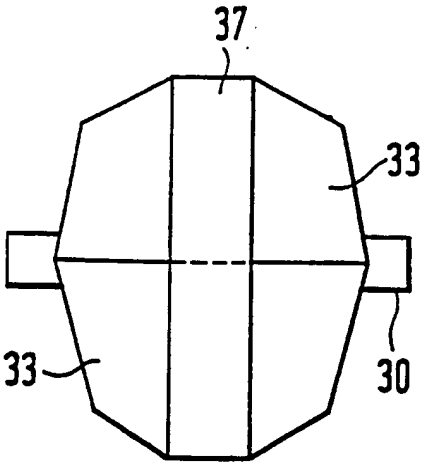


FIG.8.

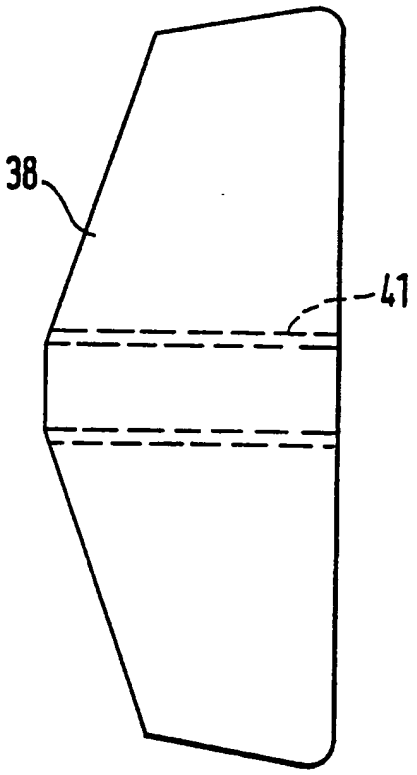


FIG.9.

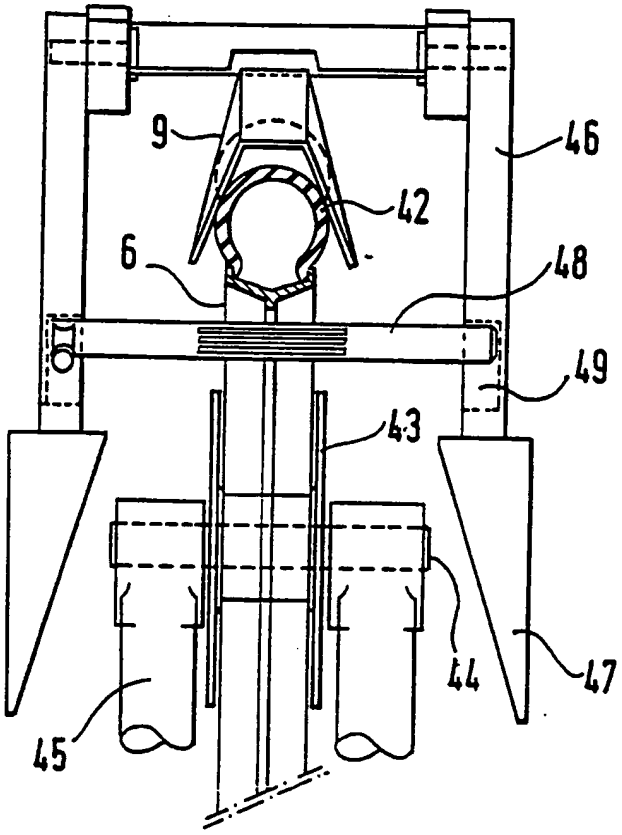


FIG.10.

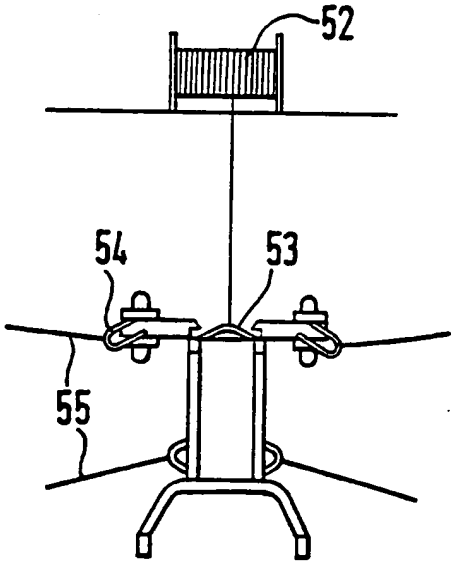


FIG.12.

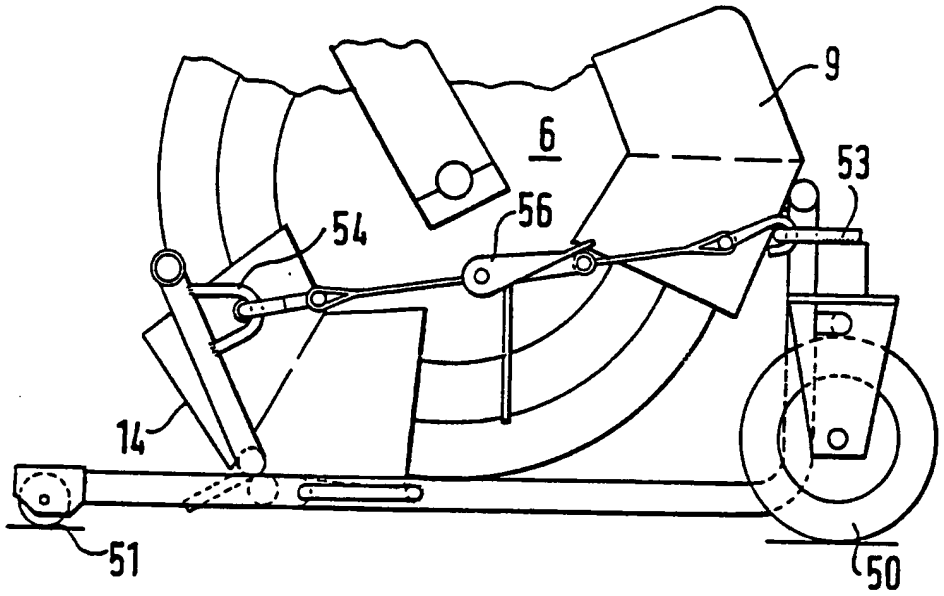


FIG.11.

INTERNATIONAL SEARCH REPORT

In tional Application No
PCT/GB 96/01276

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B62M3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B62M B60P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB,A,767 553 (SCHEBLER) 6 February 1957 see the whole document	1,3,12
A		2

A	US,A,3 430 983 (JONES) 4 March 1969 cited in the application see the whole document	1

A	DE,A,35 20 765 (KAROSSERIEFABRIK) 11 December 1986 see figures 1,2	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 July 1996	02.08.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Denicolai, G

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

In ional Application No
PCT/GB 96/01276

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-767553		NONE	
US-A-3430983	04-03-69	NONE	
DE-A-3520765	11-12-86	NONE	